

First Street Reinforced Concrete Bridge
Spanning Moxahala Creek at First Street (CR 7)
Roseville
Muskingum County
Ohio

HAER No. OH-47

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OHIO,
60-ROSE,
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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HISTORIC AMERICAN ENGINEERING RECORD

First Street Reinforced Concrete Bridge

HAER No. OH-47

Location: First Street (a.k.a. Cannelaville Road/County Route 7) over Moxahala Creek,¹ Roseville, Clay Township, Muskingum County, Ohio

UTM Coordinates: 17/408300/4406320

Date of Construction: 1909

Present Owner: County of Muskingum
Board of Commissioners
County Courthouse
Zanesville, Ohio

Present Use: Vehicular and pedestrian traffic

Significance: This bridge is an unusual example of an ornamental reinforced concrete bridge, and the first bridge designed by the noteworthy engineer, Benjamin C. Gerwick, who received patents for pre-stressed concrete construction and a caisson foundation solution in bridge construction. It also exemplifies the movement away from metal truss bridges by county highway departments towards a preference for concrete bridge construction during the early decades of the 20th century.

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FIRST STREET REINFORCED CONCRETE BRIDGE
HAER No. OH-47
Page 2

The First Street Reinforced Concrete Bridge is an example of early 20th century reinforced concrete bridge construction in the United States and features unusual decorative elements in its design. Rather than a roadway level with the approach roads, the design incorporates a gently arched gradient that gives the appearance of an Oriental bridge one might find in a Japanese or Chinese garden. The arch rises 26 1/2 feet above the water at mid-span. Thus, the bridge exudes a long slender appearance with a gently rising arch. In addition to being an aesthetic design motif, the arch allows greater clearance underneath the bridge, but at the same time causes a blind spot for approaching traffic.

The roadway is 19 feet 4 inches wide. The bridge spans 111 feet and has an overall length of 135 1/2 feet. It is made entirely of concrete with steel reinforcing. In recent years, steel braces have been placed on the surface of the bridge, particularly the railings and deck, to reinforce the exfoliating concrete.

Reinforced concrete bridges such as this one grew in popularity in Ohio and other states in the early 1900s despite much criticism from engineers throughout the country. Although concrete bridges were more expensive than metal bridges, County Commissioners in Ohio eventually became convinced that concrete bridges would endure longer and require fewer and less complicated repairs. Furthermore, at the time that the Muskingum County Board of Commissioners advertised for bids for construction of the First Street Bridge, a number of the prolific bridge

companies of Ohio had been ousted from conducting business in the state, and a public prejudice existed against them (see Forder Pratt Through Truss, HAER No. OH-42). Those factors allowed smaller bridge firms and local contractors, many of which accepted the merits of concrete bridges, to bid competitively for the First Street Bridge.

Reinforced concrete bridges first came to national attention as the result of a presentation by Fritz von Emperger, an Austrian civil engineer, at the meeting of the American Society of Civil Engineers in April 1894 at New York City. American engineers met von Emperger's remarks with skepticism. Concrete commonly was used for bridges in France and Germany, but its use in bridge construction was not generally accepted in the United States. Americans doubted whether the available materials of the 1890s and the slender, flat concrete bridge design used in Germany suited the extreme climates of North America. Yet, as the 1890s progressed and the twentieth century began, a number of bridge builders, including several in Ohio, dared to use concrete. Those first concrete bridges spurred an increase in the popularity of concrete bridges in America. The improvements of reinforcing steel and concrete aided the acceptance of concrete bridges by Americans. An Ohio company, Buckeye Portland Cement Company, stands among the earlier developers of improved materials and its success is partially responsible for an early acceptance of concrete bridges in Ohio.²

The designer of the First Street Bridge used a traditional German mode of thinness in that bridge, but he deserves note as one who made important developments in the use of concrete for bridge construction. That man, Benjamin C. Gerwick was born near Zanesville, Ohio on October 16, 1883, and spent his childhood at Beverly in Washington County. Gerwick attended Zanesville High School and became fascinated with bridges while the concrete "Y" Bridge was being constructed at Zanesville in 1902. He took his fascination for bridges to Ohio State University, where he studied civil engineering. After graduation in 1906, Gerwick went to San Francisco to help rebuild bridges that had been destroyed by the great earthquake. In 1910, he began working for Ransome Construction Company in Boston. There, Gerwick developed pre-stressed concrete and patented his method. He returned to California in 1913 and worked for various contractors until 1926, when he started his own firm. Gerwick built the Dumbarton Bridge across San Francisco Bay, designed the tunnel under the Alameda Estuary, designed the piers and foundations for the five-mile San Rafael Bridge, patented a solution using a caisson, for foundation problems in the construction of the Golden Gate Bridge. He also built the building foundations at the atomic bomb test site at Los Alamos, New Mexico.³

Gerwick enjoyed a splendid career on the west coast, but his first bridge design was the First Street Bridge in his native Ohio. His name appears on a plaque at the bridge along with F. E. Withgott, the

engineer on construction. Withgott had worked as a consulting engineer for Mt. Vernon Bridge Company⁴. The names of the contractor, county commissioners, auditor, and surveyor also appear on the plaque. Those names on the plaque remind us that politics and government played as vital role in bridge building as the engineer and builder.

The history of the political process involved in the construction of the First Street Bridge deserves note because of the debates within county government concerning the bridge and the evolutionary process by which the commissioners accepted concrete construction over metal construction.

The Muskingum County Board of Commissioners first decided to replace the former bridge at First Street in Roseville on April 30, 1906 and advertised for bids for construction of the new bridge. Yet, the commissioners rejected all bids in June because of a lack of competition in the bidding. In 1906, Ohio was obsessed with accusations against a number of major bridge companies of collusion in deciding bridge bids in advance, to the benefit of one company which would divide a share of its profits with the collusive companies. That practice stifled competition; the bridge companies often decided who would win a contract before the County Commissioners met to consider bids. Thus, the participating bridge companies benefitted from profit splitting at public expense, as the successful bidder set his price so that sufficient profit would be available for all involved. Whether contemporary sentiment against such practices influenced the Commissioners of

Muskingum County or not, they certainly felt that greater competition in the bidding would result in a bridge contract that would promise the highest quality of workmanship and materials for the least money.⁵

The commissioners evidently objected to the bridge plans proposed by the unsuccessful bidders in relation to cost estimates as well as to the lack of competition. In July 1906, the commissioners ordered the county surveyor to submit plans, drawings, representations, bills of materials, and specifications for a bridge, with an iron superstructure and concrete and stone substructure, with trusses capable of holding a live load of 100 pounds per square foot of floor surface and capable of holding 125 pounds per square foot on a permanent floor with a brick road and concrete walks. The commission required the proposed bridge to hold a concentrated load of 12 tons on a two-axle conveyance, with a distribution of ten feet.⁶

In August 1906, the Muskingum County Board of Commissioners awarded a contract for the First Street Bridge to E. J. Landor of Canton, Ohio. Landor was president of the well-known Wrought Iron Bridge Company. His individual action in bidding for this bridge may reflect his anticipation of court orders against Wrought Iron Bridge Company for his participation in bridge pools. Despite the acceptance of Landor's bid by the commissioners, the prosecuting attorney refused to validate the bridge contract. He argued that the wording of the contract was faulty and the proposed bridge plans were too indefinite. After the

commissioners again accepted Landor's bid and reworded the contract, the prosecuting attorney again invalidated the contract.⁷ It seems unlikely that a nationally known engineer and bridge builder like E. J. Landor would use indefinite plans and agree to a faulty contract due to ineptitude. Certainly, any prosecuting attorney in Ohio in 1906 was keenly aware of recent court testimonies in the case, State of Ohio ex rel. Kora F. Briggs v. Henry Hughes et al., which claimed that bridge pool members used vague plans and contracts to allow them to boost bridge costs after the beginning of construction.

The County Commissioners again asked the county surveyor in May 1907 to submit plans for the First Street Bridge, and, after receiving the county auditor's approval, the surveyor submitted plans, estimates, and specifications for a reinforced concrete bridge with a 110' arch span, 134' long and 16' wide roadway, and two 5'6" sidewalks. The county surveyor had submitted plans designed by Benjamin Gerwick, forsaking previous plans for a metal bridge.⁸ Contractors submitted bids in June, and several took advantage of an option to submit their own plans. A study of the bidders indicates that many of the big bridge companies were absent, and general contractors from central Ohio submitted bids based on their ability to simply follow predetermined plans without bothering with the prefabrication of most bridge parts, as was the practice for metal bridges. The following list shows the variety of companies and the differences in cost between concrete and steel bridges:

FIRST STREET REINFORCED CONCRETE BRIDGE
HAER No. OH-47
Page 8

<u>Plans Used</u>	<u>Contractor</u>	<u>Cost</u>
County Plans	Charles A. Warner, Bellaire, Ohio	\$12,413.00
County Plans	J. A. Swingle, Zanesville, Ohio	\$12,633.00
County Plans	F. M. Townsend, Zanesville, Ohio	\$14,585.44
County Plans	Clifton Bros., Zanesville, Ohio	\$15,076.99
County Plans	C. W. Hughes, Malta, Ohio	\$15,520.80
County Plans	Schilling & Bros., Columbus, Ohio	\$15,631.73
County Plans	John L. Mercer, Dresden, Ohio	\$16,193.00
County Plans	E. A. Patterson, Malta, Ohio	\$16,647.55
County Plans	Cook, Grant, & Fritz Bros., Zanesville, Ohio	\$18,204.02
County Plans	Pennsylvania Contracting Company Pittsburgh, Pennsylvania	\$21,839.64
Own Plans (Steel)	Champion Bridge Co. Wilmington, Ohio	\$ 4,350.00
Own Plans (Steel)	Brookville Bridge Co. Dayton, Ohio	\$ 4,300.00
Own Plans (Concrete)	F. M. Townsend, Zanesville, Ohio	\$10,540.25
Own Plans (Steel)	Dunzweiler Bros., Zanesville, Ohio	\$12,100.00 ⁹

Although the commissioners had approved Gerwick's plans for a reinforced concrete bridge, they wavered when the bids were opened. The relatively low cost of a steel bridge tempted the commissioners to abandon Gerwick's plans. However, they hesitated for only one day, and, on June 18, 1908, Charles A. Warner, a general contractor from Bellaire in Belmont County received the contract to build a reinforced concrete bridge.¹⁰ With that, the Muskingum County Board of Commissioners made an important transition away from a preference for metal bridges and contributed to the acceptance of concrete bridges in the United States, and the bridge building career of Benjamin C. Gerwick began.

NOTES

¹Moxahala Creek is the name for this stream in the Ohio Department of Transportation's Ohio Historic Bridge Inventory Evaluation and Preservation Plan (p. 121). Moxahala is an Indian word for Elk Horn. Early settlers knew this stream as Elk Horn Creek, and it still appears as such on some maps. When referring to this bridge, during its construction, the county board of commissioners called the stream South Fork of Jonathan Creek.

²David A. Simmons, "Early Concrete Bridge near Fredericktown," Ohio County Engineers News, May 1986m p. 22.

³Norris F. Schneider, Zanesville Stories, 6 vols. (Zanesville, OH.: Zanesville Times Recorder, 1972-1979), 6: n.p.

⁴Frederick N. Lorey, ed., History of Knox County, Ohio, 1876-1976 (Evansville, IN.: Unigraphic Corp., 1976), p. 172.

⁵Ohio, County of Muskingum, Board of Commissioners, Commissioners Journal (1906), 13: 157-183.

⁶Ibid., 13: 195-196, 199-200.

⁷Ibid., 13: 217-218, 225, 245, 250.

⁸Ibid., (1907-1908), 13: 397-398; 14: 65.

⁹Ibid., (1908), 14: 93.

¹⁰"May Build a Steel Bridge," Zanesville Signal, 17 June 1908.

¹¹Ohio County of Muskingum, Board of Commissioners, Commissioners Journal, 14: 94.